Statistics 414 Name: _____

Quiz 2

Make sure to put all your answers in the space provided. You are allowed to have only a writing utensil. **No** calculators, cell phones, scrap paper, etc. Also, be sure to give complete answers and to show your work. In other words, you need to not only answer the questions, **but also to convince me of your answer.**

---

1. (5 pts) If it is assumed that all $\binom{52}{5}$ poker hands are equally likely, what is the probability of being dealt three of a kind? (This occurs when the cards have denominations a, a, a, b, c where a, b, and c are all distinct.)

   solution: There are 13 ways to pick the number that will correspond to the three of a kind. There are then $\binom{4}{3}$ ways to select the suit for these. There are then $\binom{12}{2}$ ways to pick the denomination of the other two card s b and 4 ways to select among the suits for each. Thus, the answer is

$$\frac{13\binom{4}{3}\binom{12}{2}(4)(4)}{\binom{52}{5}}$$

2. (5 pts) A total of 28 percent of American males smoke cigarettes, 7 percent smoke cigars, and 5 percent smoke both cigars and cigarettes.

   (a) What percentage of males smokes neither cigars nor cigarettes?

   (b) What percentage of smokes cigars but not cigarettes?

   solution: Let $A = cigarette$ and $B = cigar$. We know that $P(A) = 0.28$, $P(B) = 0.07$ and $P(A \cap B) = 0.05$.

   (a) This is $P(A^c \cap B^c)$. De Morgan's law implies that this should be $1 - P(A \cup B)$. $P(A \cup B) = 0.28 + 0.07 - 0.05 = 0.3$. So, the answer would be
   $$P(A^c \cap B^c) = 0.7$$

   (b) This is $P(A^c \cap B)$. This may be obtained by breaking B into the disjoint events $A^c \cap B$ and $A \cap B$. Thus,
   $$P(B) = P(A^c \cap B) + P(A \cap B)$$
   or
   $$0.07 = P(A^c \cap B) + 0.05$$
   So, $P(A^c \cap B) = 0.02$